DIETARY REPLACEMENT OF SOYBEAN WITH 5% *HERMETIA ILLUCENS* MEAL IN TURKEYS: IMPLICATIONS ON BREAST MEAT QUALITY

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I. INTRODUCTION

The current demographic trend depicts a remarkable growth in the global population that, in its turn, will drive an overall increase in the demand for food and feed proteins [1]. However, due to its environmental and economic impact, several sustainability concerns are associated with soybean meal production, the main protein source for poultry and livestock [2]. Within this scenario in which human beings and animal productions will inevitably compete for proteins, the search for alternative and sustainable protein sources is deserving the attention of the academia and the poultry industry as well. In detail, although in the past few years several studies have been carried out on the use of alternative proteins in broiler chickens, those available on turkeys mainly focus on evaluating their impact on live and growth performances whereas no information is available on possible implications on meat quality. Thus, given the above, the present study aims at assessing the impact of the dietary replacement of the commercial corn-wheat-soybean diet with 5% *Hermetia illucens* meal (HIM) starting from the grower III feeding phase onward on the main quality traits and technological properties of turkey breast meat.

II. MATERIALS AND METHODS

A total of 1,512 1-day-old BUT Big 6 female turkey poults were housed in an environmentally controlled facility and randomly distributed in 18 floor pens (9/group) of 18 m^2 each (84 turkeys/pen). Birds were divided into two experimental groups of 9 replicates fed with a commercial corn-wheat-soybean diet (CON) or the same basal diet with 5% replacement of the protein source with an HIM from the grower III feeding phase (57 days) onward. When reaching 100 days old, birds were slaughtered in a commercial plant and, after deboning, 15 *Pectoralis major muscles* were randomly collected 48 hours *post-mortem*. Colour was measured in triplicate on the bone side surface of each *P. major* muscle and ultimate pH assessed in its cranial area by a portable pH-meter. In the same area, a sub-sample (8x4x3 cm) was excised and used to evaluate water holding capacity by measuring drip (after storing the meat for 48h at 4±1°C) and cooking (80±1°C in a water bath, until reaching the same temperature in the inner core of the samples) losses. Warner-Bratzler shear test was used to evaluate tenderness on a 4x1x1 cm sub-samples after cooking. Data were checked for outliers and normality and subsequently analysed through One-way ANOVA by considering the dietary replacement of the commercial corn-wheat-soybean diet with 5% HIM as main effect.

III. RESULTS AND DISCUSSION

The partial replacement of the commercial corn-wheat-soybean diet with 5% HIM from the third feeding phase onward exerted only a negligible effect on the main quality traits of turkey breast meat (Table 1), which are consistent with the reference values observed for this meat type [3]. No significant differences were found in meat ultimate pH thus suggesting that the inclusion of 5% HIM did not affect the glycolytic potential of the muscle.

Table 1. Effect of a 5% inclusion on *Hermetia illucens* meal (HIM) in feed formulation from the grower III feeding phase onward on the main quality traits and technological properties of turkey breast meat (N=15/group). sem=standard error of mean.

	CON	IM	sem	P-value
		Quality traits		
pHu	5.66	5.66	0.01	0.7410
Lightness – *L**	50.6	49.6	0.27	0.0720
Redness – *a**	3.89	3.88	0.15	0.9855
Yellowness – *b**	2.83	1.95	0.22	0.0303
		Technological properties		
Drip loss %	0.89	0.85	0.02	0.2347
Cooking loss %	17.9	19.0	0.34	0.1063
Shear force (kg)	2.36	2.29	0.08	0.6110

As for color parameters, including 5% HIM in the diet exerted only limited effects on lightness (*L**) ($p=0.0720$) and yellowness (*b**) ($P<0.05$) with the HIM group exhibiting lower *L** and *b** values if compared with CON. Although statistically significant, the differences observed in *b** are of a little extent and negligible from a practical point of view. Moreover, although this difference could be ascribable to the feed, the existence of a specie-specific different efficiency in fixing the dietary pigments at intramuscular level should be considered since as an example, if compared to broiler chickens, a lower efficiency in the deposition of vitamins and antioxidants was found for turkeys [4,5]. As for the technological properties, the inclusion of 5% HIM did not affect either the water holding capacity (as depicted by the absence of significant differences in drip and cooking losses) and tenderness of cooked breast meat. Overall, these findings showed the very limited implications of the dietary inclusion of 5% HIM on breast meat quality and has to be attributed to a likely similar conversion of muscle to meat occurring during *post-mortem* time.

IV. CONCLUSION

The dietary replacement of the commercial corn-wheat-soybean diet with a HIM, at least with an inclusion level of 5%, may represent a possible strategy to improve the sustainability of the feed without negative implications on meat quality. Further investigations will be performed to test the inclusion of higher HIM levels to define the highest replacement that can be achieved without compromising both the growth performances and meat quality.

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